NIBBLES AWAY II

Disk Backup System
for the
Apple Computer

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INSTRUCTION MANUAL

for

NIBBLES AWAY][

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the Apple][computer
without whom we would all
have a little more of our sanity

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FEATURES OF NIBBLES AWAY][

Enhanced Track Editor includes:

1. The ability to modify the data buffer, and write it out to a diskette in the modified form.
2. Print option allows the user to dump the data buffer to a printer.
3. A search option has been added, allowing the user to search for a particular string.
4. An analyze feature allows the user to use NIBBLES AWAY]['s data analyzer while in the edit mode.

Track/Sector editor:

1. Allows the user to Read/Edit/Write any sector on DOS 3.2 or DOS 3.3 diskettes.
2. A DISASSEMBLE function which allows any sector to be listed in assembly language form.

The ability to specify the track increment in units of 0.5 tracks has been included.

User oriented parameter modifier. Names are now used instead of numbers for most parameters, and others are specified by simply typing in a single set of numbers.

Expanded user manual, including documentation on all of the new features of NIBBLES AWAY][and a beginners guide to making disk back-ups.

Disk Diagnostic System: Allows the user to test drive speed and media reliability along with a disk degaussing function.

New File Manager: Provides easier access to parameter files stored on diskette and also allows the use of Auto-Load files which can perform many NIBBLES AWAY][functions sequentially without user intervention.

NIBBLES AWAY][

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PREFACE

OVERVIEW OF NIBBLES AWAY][

NIBBLES AWAY][disk backup system provides a means t protect your software investment by allowing you to mak additional copies (back-ups) of many diskettes that are no normally copyable.

NIBBLES AWAY][provides the user with many new features an techniques not found in other similar programs, with an extremel high degree of accuracy. The routines in NIBBLES AWAY][have been written to give the maximum amount of accuracy, while still making them easy to use by the average user.

BOOTING NIBBLES AWAY][

NIBBLES AWAY][may be booted from any slot in your Apple][, using either a DOS 3.2 or 3.3 disk controller. To boot NIBBLES AWAY][with an autostart ROM, simply place the master disk in the disk drive and turn on the power to the computer. If you have an 'old style' monitor ROM type 6 control-P and then press <RETURN>. The NIBBLES AWAY][logo will appear on the screen within a few seconds, then the rest of the program is loaded into the computer. When the program has finished loading, you will be prompted to press any key to continue. Doing this will result in a menu (The MASTER MENU) which asks you to select which NIBBLES AWAY][function you would like to perform. Each function on the menu is covered in detail in a separate section of the manual, starting with NIBBLES AWAY][itself. On the left is an example of the main menu.

```
MASTER MENU

N - NIBBLES AWAY ][

T - TRACK/BIT EDITOR

S - SECTOR EDITOR

D - DISK DIAGNOSTICS

F - FILE MANAGER

M - MODIFY PARAMETERS

ENTER SELECTION ->
```

CHAPTER 1

NIBBLES AWAY][

To use NIBBLES AWAY][, you should select the first item on the master menu by pressing the 'N' key. A list of options is then displayed and the cursor is placed at the question asking if you wish to alter the default values for the options. Below is a list of the options and their respective values. The values shown to the right of the options are those that will be used if you do not specify otherwise. Pressing <RETURN> for an option will select the default value for that option.

EXAMPLE OF THE INITIAL PAGE

```
CHANGE DEFAULT VALUES -> N        <-- 'Initial prompt'

 DISK DRIVE SLOT    -> 06
 SOURCE DRIVE       -> 01         <-- These stay until
 DESTINATION DRIVE  -> 02             specifically changed

 STARTING TRACK     -> 00         <-- These default back
 ENDING TRACK       -> 22             to these values
 TRACK INCREMENT    -> 01

 DATA MOVER ONLY    -> N
 SYNCHRONIZED COPY  -> N          <-- These always
 ERASE DEST TRACKS  -> N              default to 'N'
 AUTO HALF TRACKS   -> N
 REDUCED ERROR CHK  -> N
```

NOTE: At each item, the backspace key can be used to move the cursor to the previous item.

NOTE: All numbers MUST be entered in HEXADECIMAL. (For a Decimal to Hexadecimal conversion table see Appendix D)

NOTE: A WRITE PROTECT TAB SHOULD BE PLACED ON ALL ORIGINAL SOFTWARE BEFORE BACK-UP IS STARTED TO AVOID A PROBLEM IF THE DISK DRIVE ORDER IS INADVERTANTLY REVERSED.

The following pages describe each of the options displayed in the order in which they are displayed.

DISK DRIVE SLOT

This is the slot number of the disk controller which is to be used for the back-up. If two drives are used, they must both be connected to the same controller. This option will keep any value assigned to it until specifically reassigned. (e.g. If you select slot 4, slot 4 will be used until you select another slot)

SOURCE DRIVE

This is the disk number that will contain the original disk to be duplicated. This value also retains any value entered until another is assigned to it.

DESTINATION DRIVE

Enter the disk drive number that will contain the blank disk that you wish to backup onto.

NOTE: On a one drive system, drive one should be selected as both the source drive and the destination drive. You will then be prompted to switch disks during the back-up procedure.

STARTING TRACK

Enter the track number that you wish to begin with or press return to use the default value of track 00. Legal track numbers are in the range of 00 23, and half tracks may be specified using a '.5' after the track number.

ENDING TRACK

Enter the track number that you wish to end with, or press return to use the default value of track 22. Legal track numbers are the same as for STARTING TRACK.

NOTE: Most diskettes have only 22 tracks. On some rare occasions you may need to select track 23 as the ending track, However this is not normal.

TRACK INCREMENT

This is the increment which will be used to step from the starting track specified above, to the ending track, also specified above. The default value here is 01, However, some disks place their data at non-standard intervals. This option allows the user to compensate for this.

DATA MOVER

When selected, this option tells NIBBLES AWAY][not to analyze the information that it reads but to write it out on the destination disk in whatever form it happens to be in. This option is rarely used, but is provided for any instance when a track is known to contain some type of data which cannot be read by the normal option selections. Due to the data movers operation, a given track may have to be copied several times. If this option is selected, no other questions are asked since they pertain to forms of analyzing which the data mover does not do.

SYNCHRONIZATION

When selected, this option causes all tracks on the destination disk to be written with the same orientation to track 0 as on the original. This is needed when a disk being backed-up requires not only that the proper data be present, but that the tracks be positioned in certain patterns. This can correct problems on disk which appear to boot but then fail to operate properly at the last moment, even though no errors were reported during the back-up procedure.

NOTE: While backing-up track 00, NIBBLES AWAY][does not synchronize. On track 00 it finds a reference that will be used to position all other tracks to. Therefore, track 00 must ALWAYS be backed-up in order for any other tracks to synchronize properly.

ERASE DESTINATION TRACKS

This will cause the range of tracks which will be written to on the duplicate disk to be erased. This is recommended if the next option, auto half tracks, has been selected, and the destination disk previously contained other data.

NOTE: See the section on ERASE BUFFER MODIFIER for additional information on the erase function.

AUTO-HALF TRACKS

This option, when selected, tells NIBBLES AWAY][that it should step forward by .5 track increments if a given track is found not to contain data, as opposed to the full track step normally used. Use of this option can uncover hidden data on a disk which gives a large quantity of read errors with the standard options selected.

REDUCED ERROR CHECK

This option reduces the amount of error checking which is done by NIBBLES AWAY][during the analyze and verify stages. This is useful if a high number of intermittent read errors are encountered. (e.g. Many tracks back-up only after 3 or 4 read errors).

STATUS FIELD DISPLAY

During the backup procedure the status of the program is shown on the screen. The function being performed is shown at the top. Any errors which occur are displayed to the right of the function line. The current track being operated on is shown to the left of the function display.

The lower portion of the screen shows which tracks have been successfully copied with an inverse 'Y' next to the track number (Half-tracks are shown to the right under the heading 'HLF'). An 'N' indicates that the track was not successfully copied (This does not necessarily indicate a problem, since an unused track may not have any valid data to back-up).

The two digits to the right of the Y or N show the number of read and write errors, respectively, which were encountered on that particular track.

EXAMPLE STATUS FIELD DISPLAY

READING

TRACK=21.5

TRACK	HLF	TRACK	HLF	TRACK	HLF
00-Y00		0C-Y00		18-Y00	
01-Y00		0D-Y00		19-N50	Y00
02-Y00		0E-Y00		1A-	Y00
03-Y00		0F-Y00		1B-	N50
04-Y00		10-Y00		1C-N50	Y00
05-N50		11-Y00		1D-	N50
06-	Y50	12-Y00		1E-N50	Y00
07-	N50	13-Y00		1F-	Y00
08-Y00		14-Y00		20-	Y00
09-Y00		15-Y00		21-	
0A-Y00		16-Y00		22-	
0B-Y00		17-Y00			

Display shows whether or not a track copies with a 'Y' or an 'N'

The first number which follows signifies the number of read errors encountered on that particular track. The second one shows the number of write errors encountered.

EXECUTION TIME COMMANDS

While the program is operating certain keys can be pressed to perform additional functions. They are as follows:

<ESC> Aborts the function in progress and waits for you to press any key to restart the program.

<G> Turns on GRAPHIC DISPLAY. This shows you the raw data as it is read off the disk in Hi-Res graphics. By noting the patterns viewed, and which ones cause read errors, it can be determined visually which tracks contain some form of data and which are just random information.

<T> Text mode. Cancels Graphics mode.

<SPACE> Causes NIBBLES AWAY][to skip the track currently being copied. With the normal options selected, the track counter is incremented by the currently set increment value. If auto-half tracks are selected, then .5 is added to the track counter.

CHAPTER 2

THE MODIFIERS

To enter the modifiers, press 'M' from the master menu. You will then be prompted with another menu. The options on the menu reflect the different types of modification which can be done to NIBBLES AWAY][. The options are as shown on the right. A description of each of the menu functions follows below, along with samples of what will be seen on the screen for each option. The modifiers menu is shown on the right.

```
PARAMETER SET MODIFICATION

        B - BACKUP

        C - CONTROL

        F - FILTER

        E - ERASE

        S - SYNC ADD

        G - GLOBAL

ENTER SET TO MODIFY ->
```

Pressing 'B' will allow you to change the BACKUP parameters. You will be prompted with the question 'USE ADDRESS MARK ->'. This is asking whether or not you would like to enter the specific address mark (See the section for Advanced Users for details). If you answer 'Y', the cursor will move down and prompt you to enter the address mark. This is done by entering pairs of hexadecimal digits separated by spaces (i.e. D5 AA 96) and then pressing RETURN. Upon your next entry into the BACKUP modifier, this address mark will be displayed and can be turned off by specifying 'N' at the 'USE ADDRESS MARK' question.

After either selecting an address mark or answering 'N' at the previous question, you will be asked if you would like to specify an insert mark (See the Advanced Users section for details on the function of this option). In the same fashion as for the previous question, pressing 'Y' causes NIBBLES AWAY][to ask for the specific insert mark, while pressing 'N' will cause the cursor to move to the next question.

EXAMPLE OF BACKUP OPTIONS

```
BACKUP PARAMETERS

USE ADDRESS MARK ->N
USE INSERT MARK  ->N

OVERIDE NIBBLE FILTER ->N
OVERIDE GLITCH DETECT ->N
USE NIBBLE COUNTER    ->N
OVERIDE SYNC CONVERT  ->N
OVERIDE STANDARDIZER  ->N
```

At any time, the backspace key may be used to move back to previous items to correct an error. After all of the questions have been answered you will be returned to the modifier menu.

The next five questions ask for yes or no answers as to whether or not their specific functions should be enabled during the backup procedure. The functions of these options are discussed in the Advanced Users information.

Pressing 'Q' from the initial prompt on this page will return you to the modifiers menu.

Pressing 'C' from the modifier menu will take you to the control parameter modifier. A list of parameter names and values will appear on the lower portion of the screen, with a set of inverse arrows positioned to either side of the first number. The left and right arrow keys will move the inverse arrow on the screen up and down, and over to the second column. To modify any of these parameters, place the inverse arrows adjacent to the parameter to be modified. Pressing the space bar will result in the question 'ENTER NEW VALUE-->'. Typing in the desired value and pressing RETURN will update the value next to the parameter name. Several parameters may be updated at one time. Pressing 'Q' will exit the control-parameter modifier and return you to the modifier menu.

CONTROL PARAMETERS

FIND MAX	->0C<-	DATA LIM	65	The arrows are moved
DEL BYTE	30	DATA MIN	13	by pressing the left
GAPBYTE1	FE	DATA MAX	1D	and right arrow keys.
GAPBYTE2	00	SYNC SYZ	09	The space-bar will
RDERR MX	05	FIX AMNT	08	cause a prompt above
WRERR MX	07	FIX VALU	7F	asking you for a
SYERR MX	05	PAGE LEN	42	new value for that
GAP SIZE	0C	LF VALUE	0A	parameter. Entering
FALSE LO	0A	SHIFT N+	00	this parameter and
FALSE HI	1B	SHIFT N-	08	pressing <RETURN>
GAP HIGH	48	OFFSET +	00	will enter the value
TOLERANC	00	OFFSET -	00	into the list.

Pressing 'F' from the modifier menu will cause the current NIBBLE FILTER to be displayed on the lower portion of the screen. The left and right arrows may be used to move the arrows around through the different values displayed. The keys I,J,K,M will move the arrows up,left,right and down, respectively. Pressing the space bar will cause a value to alternate between inverse and normal text. Any value which is displayed in inverse will be filtered from the data which NIBBLES AWAY][writes to the destination disk, thus enabling the user to eliminate invalid bytes from the data written out.

Pressing the 1,2 and 3 keys will invoke the STANDARD, DOS 3.2 and DOS 3.3 filters, respectively. The values in inverse on each of these options are those which are not considered valid for that system. Option 1 is the default value for NIBBLES AWAY][, and only removes those values which are not valid for any system with the Apple Disk][drives. Care should be used with this option as valid data could be filtered out by an incorrect setting of this filter.

Pressing 'Q' will exit to the modifier menu.

Pressing 'E' from the modifier menu will cause the current ERASE BUFFER to be displayed. The ERASE BUFFER is a set of 128 bytes which are the last bytes to be written out to a disk during an erase function. The arrows may be moved around in the same fashion as that described for the NIBBLE FILTER. Pressing the space bar will result in a request for you to enter the new value for that position in the buffer. Any value which less than $80 will be displayed in inverse with $80 added to it and will represent the byte that will be written to the disk, except that those values in inverse will be written as SYNC-BYTES. (See the Advanced Users Guide for more detail). Pressing 'Q' will exit this option.

SYNC ADD PARAMETERS

>80<	90	A0	B0	C0	D0	E0	F0
81	91	A1	B1	C1	D1	E1	F1
82	92	A2	B2	C2	D2	E2	F2
83	93	A3	B3	C3	D3	E3	F3
84	94	A4	B4	C4	D4	E4	F4
85	95	A5	B5	C5	D5	E5	F5
86	96	A6	B6	C6	D6	E6	F6
87	97	A7	B7	C7	D7	E7	F7
88	98	A8	B8	C8	D8	E8	F8
89	99	A9	B9	C9	D9	E9	F9
8A	9A	AA	BA	CA	DA	EA	FA
8B	9B	AB	BB	CB	DB	EB	FB
8C	9C	AC	BC	CC	DC	EC	FC
8D	9D	AD	BD	CD	DD	ED	FD
8E	9E	AE	BE	CE	DE	EE	FE
8F	9F	AF	BF	CF	DF	EF	FF

Pressing 'S' from the modifier menu will display the current SYNC-ADD buffer. This buffer shows in inverse all of those values which will be converted to SYNC every time they are encountered in the data read and written by NIBBLES AWAY][. The movement of the arrows is controlled in the same way as for the two previous options, and the space bar toggles an entry between inverse and normal, representing whether or not that value will be converted to SYNC. Initially, no values are selected to be converted to SYNC. As with the previous options, 'Q' exits to the modifier menu.

To invoke the GLOBAL modifier, simply press 'G' from the modifier menu. You will then be prompted to enter a byte number. After entering the desired byte number, the current value of that location will be displayed, and you will be asked to enter a new value for that byte. Pressing <RETURN> alone will leave the byte as it is. This function is used to change certain control variables as described in other portions of this manual. The values to enter for a specific parameter are supplied in the section describing that particular parameter's function. To exit the GLOBAL modifier, enter a 'Q' when prompted for an address. This will return you to the modifier menu.

Any changes which are made to the internal parameters are permanent until NIBBLES AWAY][is rebooted, when they return to their normal values. If you wish to save the parameters that you have changed, you can use the SAVE option in the FILER. Then if you wish to use the same parameters at a later time, you only need to LOAD them back in using the FILER.

- TABLE 1

BYTE NAME	DEFAULT VALUE	PURPOSE
FIND MAX	$0C	This byte specifies the minimum number of bytes which must match to verify data validity.
DEL BYTE	$30	This byte controls the delay used in seeking the disk drives from track to track. The lower the number, the faster the drives will seek.
GAPBYTE1	$FE	Minimum GAP-BYTE recognized.
GAPBYTE2	$00	Maximum GAP-BYTE recognized + 1.
RDERR MX	$05	Maximum number of read errors allowed before skipping to the next track.
WRERR MX	$07	Maximum number of write errors.
SYERR MX	$05	Maximum number of sync errors.
GAP SIZE	$0C	Minimum number of bytes needed to determine a GAP.
FALSE LO	$0A	Number of bytes forward to look for a 'False GAP'.
FALSE HI	$1B	Number of bytes forward which determine the end of a false GAP.
GAP HIGH	$48	High order byte of the highest address to look for a GAP at.
DATA LIM	$65	High order byte of the effective limit of the READ BUFFER.
DATA MIN	$13	Minimum number of pages forward at which to search for a GAP.
DATA MAX	$1D	Maximum number of pages forward at which to search for a GAP.
TOLERANC	$00	Maximum number of bytes by which the byte counts can differ on a nibble count.
SYNC SIZ	$09	Sets length of the sync bytes written to the disk in one bit increments. Only the values $09 and $0A have any effect here.

TABLE 1

BYTE NAME	DEFAULT VALUE	PURPOSE
FIX AMNT	$08	Number of GAPBYTE's which are converted to sync in each GAP.
FIX VALU	$7F	Value of SYNC used to replace GAPBYTE's for sync conversion.
PAGE LEN	$42	Page length used in the TRACK/BIT editor during a memory dump.
LF VALUE	$0A	Line feed character used during a memory dump. Change this value to a $00 if your printer produces double line feeds.
PRT SLOT	$01	This is the slot number of the printer to be used.
MATCH NM	$03	This is the number of times that a nibble count must match to be considered valid.
SHIFT N+	$00	Along with the next parameter, defines the 'window shift' for the nibble counting option.
SHIFT N-	$08	Used with the previous parameter, see the appendix on nibble counting for details.
OFFSET +	$00	Along with the next parameter, defines the offset from the insert mark to the SYNC BYTE to be added.
OFFSET -	$00	Used with the previous parameter, defines the reverse shift used to determine the location of the inserted SYNC BYTE.

CHAPTER 3

USING THE TRACK/BIT EDITOR UTILITY

The TRACK/BIT EDITOR (TBE) has been provided so that the user will be able to determine the values for the parameters described in the chapter on the modifiers in order to back up diskettes which are extremely abnormal. It also provides the user with an invaluable utility to read/edit/write the nibbles on a diskette.

To use the TBE simply press 'T' from the master menu. Drive one will immediately turn on and seek to track 0. The screen will show you 256 bytes of memory, with their respective addresses shown on the left. Pressing the forward arrow will shift your memory display 256 bytes forward, while the backward arrow will shift it 256 bytes backwards, allowing you to view all of the memory from $2000 to $7FFF.

Two lines will appear above the data display area. In between these lines is the status information for the Track/Bit editor. At the left hand side of the screen the word PTR is shown, followed by a four digit number. This is the memory address that NIBBLES AWAY]| will use as the starting address for a write command ($8000 is always the ending address). In the center, ADDR is followed by a four digit number representing the current position of the inverse cursor in the read/write buffer. At the right, the current track number is displayed.

Below is a explanation of the commands available in the Track/Bit Editor. They are as follows:

I,J,K,M ..These keys form a 'movement diamond' and cause the inverse cursor to move up,left,right and down, respectively.

<-,-> ....Left and Right arrows. These Keys shift the page of memory displayed an the screen forward or backward from its current position.

R .....This causes the current track to be read into the read/write buffer. A message is displayed in the center of the status line while this takes place.

W .....This writes the data in the read write buffer, starting at the PTR location and ending at the end of the read write buffer ($8000). The data will be written to the current track after the user types a 'Y' in response to the VERIFY prompt in the status line.

<SPACE> ..This enters the EDIT subsystem with the following commands:

0-9,A-F ..This enters a hex value into the edit window in the status line. The numbers will scroll to the left as more are entered.

<RETURN> .This enters the current value in the edit window into the read/write buffer at the current cursor location and exits the edit mode.

<-,-> ....These keys move the cursor forward and backward in the read/write buffer without disturbing the data currently there.

<SPACE> ..This moves the cursor forward, entering any value in the edit window before moving the cursor. This allows multiple changes to be made by entering a new byte, pressing <SPACE>, entering a new byte, and so on.

; .....This increments the current track number.

- .....This decrements the current track number.

T .....Allows the direct entry of a specific track number.

P .....Allows the entry of a new PTR value.

A .....Enters the ADD mode. Bytes to be inserted may be typed into the edit window. Then <RETURN> may be pressed to enter the value and exit, or <SPACE> may be pressed to insert the value and move the cursor to the next location for another insertion.

D .....Deletes the byte at the current location.

G .....Prompts 'GO TO ->' and waits for the user to enter the address in the read/write buffer that the cursor will be moved to. Valid values range from $2000-$7FFF. Entering 'P' will move the cursor to the current PTR. Entering 'B' or 'E' will move the cursor to the beginning or end of the read/write buffer, respectively.

H .....Toggles the high bit of the value at the cursor.

Z .....Calls the internal analyze routines of NIBBLES AWAY][. The data in the read write buffer will be analyzed, placed at the end of the read/write buffer, and the PTR value will be set to the beginning of the data. ERR will be displayed if an analyze error occurs.

Q .....Exits to the MAIN MENU.

C .....This will display the number of bytes to the next occurance of the bytes at the cursor.

S .....This option prompts the user for a string of bytes to search for starting at the current location. The bytes are entered as pairs of HEX digits separated by spaces. Entering 'S' will use the last entered search string. If the string is not found a bell will sound and the cursor will not move. If the string is found, the cursor will move to the location where it is found.

O .....This calls the OUTPUT option which will print all or a portion of the current buffer on your printer. If a NIBBLES AWAY][compatible printer is not detected, an error message will be displayed, and the user will be asked to press any key, returning to the Track/Bit Editor.
If a compatible printer is detected, the user is prompted to enter the desired starting and ending addresses for the memory dump, and the title to be printed at the top of each page. The user is then prompted to press any key to start.
After the printing has begun, 'Q' can be pressed at any time to abort the printing operation, even if the printer goes off line.

EXAMPLE OF PRINT OPTIONS PAGE

```
              TRACK EDITOR
----- ------------------------------------
PTR=2000      ADDR=2000          TRK=00
-----------------------------------------

            PRINT FUNCTION

      STARTING ADDRESS ->2000

      ENDING ADDRESS   ->8000

 TITLE ->ANY TITLE MAY GO HERE


     POSITION PRINTER AT TOP OF PAGE
       THEN PRESS ANY KEY TO START
```

The current track number is printed on the printout along with the data.

The starting and ending addresses are entered here.

The title is printed on each page of the printout.

The appendix for Advanced Users contains information about the meaning of the data displayed by the TBE, please consult that section for details.

On the following pages are some examples of what you may see using the TBE to look at different tracks on a diskette.

TRACK EDITOR

PTR=6734 ADDR:4643 TRK=00

```
4600-D7EDF6BE B5AEBBAC BDDDEBAE BBACB9FE
4610-CDEAAC9E D6E7EDF7 F7BECFF9 DEADE99E
4620-DFEBDCDA DDECFDD3 B3FDEAD3 FDFAB2BE
4630-FF9AB5B9 D9FFA7F3 FFBE9ABC 9ADFF7F7
4640-DAFAE9DB DEAAEBEB FFFFFFFF FFFFFFFF
4650-FFFFFFFF FFFFFFFF FFFFFFD5 AA96FFFE
4660-AAAAAFAF FAFBDEAA E6DFCFDF E7F9FEFF
4670-FFD5AAAD E6E6F9F2 9BFCF4DA DAEDFFFD
4680-E9F6E7E9 B297EAD3 CDADB2BE CBEDD7BD
4690-9AD9F4BC B6AFBA9D BEFCE6DA B3F3EDEB
46A0-CFF7EEB3 FDE9BEFD ABF9B59B F9BB9FFC
46B0-CD9AD9D9 EFBFA7DF F7DDDDD7 F39EFAEF
46C0-FFFFA7F7 EED7FAEB FCE7D6E7 96F2D39F
46D0-BBFCB7FA B2AEE796 EFB5BCF4 ABCFFFFA
46E0-F59AF3D9 BDE6B9FD 97FCFDD9 D3FEAFDE
46F0-E5E6B2AE DFBBFDE7 E5B4DECE BEEEF4F3
```

This is a standard DOS 3.3 diskette.

19 $FF's used as GAPBYTEs here

Address marker begins with D5 AA 96

Data marker D5 AA AD

Data follows

TRACK EDITOR

PTR=6846 ADDR=4016 TRK=01.5

```
4000-9F9FAEFB EEF4DDF2 979BEDF3 9E96CE9F
4010-BFBAD7EF F7F7FAD4 D7FEFDBF B7FDD3FB
4020-BBBCAEDE D5EAD6F3 FDEEDDF4 979EEDE5
4030-BECD97D7 AE9BFFED DDF4979E EDFADFFD
4040-9796AF9B FBFFDDF4 979EEDE5 BECD9797
4050-AE9BFAFE DDF4979E EDEEDFCD 97F6AF9E
4060-FEFFB9F6 EBBE9F9D F5F29A97 EDEF9BBE
4070-9F97B5FB FFFBDDEE 9DA6F2F2 96F6A6FF
4080-BEDDCDFF FADDF4F7 9EEDEFB6 DEAAEBF1
4090-D7DFAAAA AAAAAAAA AAAAAAAA AAAAAAAA
40A0-AAAAAAAA D5AB96FF FEAFAAAE ABFEFFDE
40B0-ADEBFDFA A9ABAAAA AAAAAAD5 AAAEBFFF
40C0-B6EFBDED FFFBF7B7 DBFAFBF7 B5BBBBF5
40D0-BBBEFDFF F7D7ADE2 EFEFBDAD DFF7A8CF
40E0-FDCBEFF5 B2F5BEB5 BED697B2 D6D7DBAD
40F0-EBB78FDE FFF9BAD4 DFDDBDFE FAFBFFCF
```

This is a diskette which uses $AA's in the GAPs as part of its protection

$AA'S USED IN GAP

Address marker changed to D5 AB 96

Data marker D5 AA AE

TRACK EDITOR

PTR=6987 ADDR=7700 TRK=03

```
7700-AAAAAAAA AAAAAAAA AAAAAAAA AFFBFFFF
7710-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
7720-FFFFFBFC E1BFE7FF FFFFFFFF FFFFFFFF
7730-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
7740-FFFFFFFF FFFFFFF3 F4E7F6FF FFFFFFFF
7750-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
7760-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
7770-FFFFFFFF FFFFFFFF FFFFFFFF FFE7F9FE
7780-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
7790-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
77A0-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
77B0-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
77C0-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
77D0-FFFFFFFF FFFFFFFF FFFFFFDD ADDAAAFA
77E0-AAFAAAFA EAFAEAFA EAFAEAFA EAFAEAFA
77F0-EAFAEAFA AAFAAAFA AAFAAAFA AAFAAAFA
```

This is a protected diskette which does not use a second GAP

Extra large GAP

Glitches present but FALSE LO and FALSE HI are set to ignore these

Section of 'pure' GAP just before the address marker

Address marker DD AD DA

TRACK EDITOR

PTR=6763 ADDR=5250 TRK=1F.5

```
5200-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
5210-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
5220-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
5230-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
5240-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
5250-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
5260-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
5270-FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
5280-FFFFFFFF FFFFFFFF FFFFFFFF FFD5AAB5
5290-FFFEABAB AEAEFAFB DEAAEBFF FFFFFFEF
52A0-FFFFFFFF FFFFFFFF FFD5AAAD ABABABAE
52B0-BDDEEAAF AFBDBBBE B7BAAEAD BDFBF5BA
52C0-EBBFDAFE FEFEFFDB F5EEBDDB AEF7DDBB
52D0-EFBEABBE EEEDDBB7 ABABABAB ABABABAF
52E0-EADDBED7 DAD6BEDB ABB6FEDF B5ADB6DA
52F0-BBEAAEBA BEB5BBBD BDBBB5FA EEEAEEAD
```

This is from a DOS 3.2 diskette

Large preceding GAP

Address marker D5 AA B5

Second GAP

Data marker D5 AA AD

TRACK EDITOR

PTR=2000	ADDR=2B53		TRK=04
2B00-EEBBDAAE	AEEAEADA	ADD7D7D7	AEFEFBB6
2B10-BAABEAED	BADADADA	ADADADAF	AED7D7AD
2B20-ABABABD6	AFAFEADD	BBB6AFAD	BBDEAAEE
2B30-ABD5ABD5	ABD5ABD5	ABD5ABD5	ABD5ABD5
2B40-ABD5ABD5	ABD5ABD5	ABD5ABD5	ABD5ABD5
2B50-ABD5ABD5	ABD4AAB7	FFFFAAAE	AAABFFFA
2B60-DEAAEEFE	FFADAAAB	D5ABD5AB	D5ABD5AB
2B70-D5AAADAF	ADBBABDA	B5AFB6AE	DDEFDAEF
2B80-F5AEABB7	EFBAFBBD	BEFFEFAF	AEB5D6BA
2B90-BAAFAEBB	BFBDBDAF	DBB6B6BE	BFB5BFBE
2BA0-F5FABFDA	BFBABEDF	DFB7DDFB	F5ABDDAB
2BB0-D6F5BBF5	ABDEEDB5	B5B7AEED	DEB5B6AE
2BC0-BFD7B5AE	AEADEAEE	EDDFB6BB	BABBBAB7
2BD0-BDBEBEBD	BFBBADAE	B6EBABDD	B7B7ABAB
2BE0-BBD6B5BB	ABDBAFAB	ABBBAFBF	ABABFDFD
2BF0-BBBBB5BB	B5DDEBEB	EBD7B6BE	DDDBEDBB

This is a disk which uses several bytes in the GAPs.

The GAPs are made up of D5 AB's.

To locate the data the address mark of D4 AA B7 must be specified, since the GAPBYTEs cover too wide a range of values.

TRACK EDITOR

PTR=2000	ADDR=2465		TRK=11
2400-A28D95B5	A2B190A7	A7F0A3C2	80B8B8B8
2410-B8ACAAAA	C5C5E983	A7A8AAAF	C0EEEEC4
2420-828B8280	808080C3	C3C5C5C5	D98CCACA
2430-CACAF0B8	AE8287B0	B0A0A0CC	B8C0C0C0
2440-C0CC88A0	D4A6C486	8E9882AA	80A7A794
2450-88888888	A0D9808E	A0A0DADA	BDA0A3A3
2460-A3C0A0B4	B4C0A0A0	AB80A0A0	A0A0B8A0
2470-A1B0A18A	80808090	909C9C9C	A1929088
2480-8888A480	C198A0C0	D8A09194	B8B8B8A1
2490-CAA19EA0	A0CC889A	B2A9A9CA	C0A280A0
24A0-E8A8A880	80AAA0C0	A29999B8	92A8A0F1
24B0-8880A0A0	A0A0A0A0	CACACFAA	A7E5A283
24C0-A0A0C0AF	AFCCCCA0	C0A0B4D4	A3A280C0
24D0-B4B4A0A0	A0C0BAA0	A0B8A0B5	8696A2AD
24E0-ADA0CCAD	ADB7C8B6	B1949494	EAB280A1
24F0-D0D8A0D8	A0A0A0A0	ADA888A2	80B488A0

This is from a track which was not used.

The large quantity of bytes ending in 0 is an easy way to identify this type of track.

The degauss option will create a disk like this.

CHAPTER 4

USING THE TRACK/SECTOR EDITOR

The Track/Sector Editor (TSE) is invoked by typing 'S' from the main menu. This option allows the user to read, edit and write to any sector on a DOS 3.2 or DOS 3.3 diskette. The data in the sectors may be displayed in HEX or ASCII code, or a disassembly listing may be selected. The checksum used by the internal read/write routines may also be disabled, to allow reading or writing to disks with non-standard checksums.

The screen format for the TSE is similar to that found in the TBE (Track/Bit Editor). The current track and sector numbers are displayed between the two dashed lines in the upper portion of the screen (The status field). The valid commands for the TSE, along with their respective functions, are listed below.

I,J,K,M ..These move the cursor up, down, right and left.

<-,-> ....These move the cursor left and right.

A .....This switches the screen display from HEX to ASCII and back again. (The cursor is an inverse block in HEX mode and switches to a pair of '[ ]' surrounding the character in the ASCII mode.

R .....This reads the currently selected sector into whichever buffer is currently selected. If an error occurs, a message will be displayed in the status line.

W .....This writes the current buffer to the currently selected sector on the disk. If an error occurs, a message is displayed in the status line.

T .....This allows the direct entry of a particular track number.

S .....Allows the direct entry of a specific sector number.

O .....This selects the OPTIONS page whose commands are as follows:

S ...Increments the current slot number.
D ...Toggles the current drive number.
F ...Toggles the current disk format (13 sector / 16 sector)
C ...Toggles the checksum flag in the internal read/write routines on or off. This allows them to access a sector whose Closing Marks (See the Advanced Users Guide) have been modified. Care should be taken when writing with this option, as the sector written will use the standard closing marks.
<RETURN> ...Exits the OPTIONS page.

L .....Invokes the Disassemble function. This will list, in 6502 assembly language, the data starting at the current cursor location. The left and right arrow keys may be used to move forward an backwards throughout the listing, and a bell will sound if you try to move beyond the limits of the current sector. The addresses and offsets shown are all referenced to $0000 starting at the beginning of the current sector. The <RETURN> key cancels this function.

B .....This allows the user to select from 8 different data buffers within NIBBLES AWAY][. These buffers are numbered from 0-7 and the desired number should be entered at the displayed question. If data is read into one buffer, the other 7 are left undisturbed. This function is useful for moving several sectors from one location to another.

<SPACE> ..This enters the EDIT mode. The following commands are used in the EDIT mode:

0-9,A-F ..These enter a HEX value into the edit window. The values scroll to the left in this window and only the last two are used.

<SPACE> ..This enters any values typed in at the current cursor location, and moves the cursor to the next location.

<-,-> ....These move the cursor left and right.

<RETURN> .This exits the edit mode.

+ .....Increments the current track and sector number.

- .....Decrements the current track and sector number.

Q .....Exits to the main menu.

The following pages contain examples of the various screens which the TSE can display.

SECTOR EDITOR

TRK=00 SEC=01

```
00- 8EE9B78E F7B7A901 8DF8B78D EAB7ADE0
10- B78DE1B7 A9028DEC B7A9048D EDB7ACE7
20- B7888CF1 B7A9018D F4B78A4A 4A4A4AAA
30- A9009DF8 049D7804 2093B7A2 FF9A8EEB
40- B74CC8BF 2089FE4C 849DADE7 B738EDF1
50- B78DE1B7 ADE7B78D F1B7CEF1 B7A9028D
60- ECB7A904 8DEDB7A9 028DF4B7 2093B7AD
70- E7B78DFE B6186909 8DF1B7A9 0A8DE1B7
80- 38E9018D FFB68DED B72093B7 60000000
90- 000000AD E5B7ACE4 B720B5B7 ACEDB788
A0- 1007A00F EAEACEEC B78CEDB7 CEF1B7CE
B0- E1B7D0DF 60087820 00BDB003 28186028
C0- 3860ADBC B58DF1B7 A9008DF0 B7ADF9B5
D0- 49FF8DEB B760A900 A89142C8 D0FB6000
E0- 1B020A1B E8B700B6 016002FE 0001FBB7
F0- 00B70000 0202FE60 02000000 01EFD800
```

This is the third stage boot sector from a DOS 3.3 slave diskette.

The cursor is shown as an inverse block which can be moved throughout the data area.

The values may be edited and then written to the disk.

SECTOR EDITOR

TRK=00 DISASSEMBLE SEC=01

```
0000-  8E E9 B7   STX   $B7E9
0003-  8E F7 B7   STX   $B7F7
0006-  A9 01      LDA   #$01
0008-  8D F8 B7   STA   $B7F8
000B-  8D EA B7   STA   $B7EA
000E-  AD E0 B7   LDA   $B7E0
0011-  8D E1 B7   STA   $B7E1
0014-  A9 02      LDA   #$02
0016-  8D EC B7   STA   $B7EC
0019-  A9 04      LDA   #$04
001B-  8D ED B7   STA   $B7ED
001E-  AC E7 B7   LDY   $B7E7
0021-  88         DEY
0022-  8C F1 B7   STY   $B7F1
0025-  A9 01      LDA   #$01
0027-  8D F4 B7   STA   $B7F4
```

This is what would be shown if the sector above were disassembles using the 'L' option.

This is the 6502 assembly language equivalent of the first $28 bytes of the previous dump.

The arrow keys may be used to page through the listing.

```
                SECTOR EDITOR
-----------------------------------------
TRK=01                              SEC=08
-----------------------------------------
00-[U]N V E  R I F Y  @ ! 0    0 ! 0
10- 0   0    0   0    0   @ "  F   4 "
20- F " D #  8 " 0 0  0 @ 0 @  @ @ @ H
30- @ H @ D  @ @ 0 @  @ ! 9    1   1
40- 0 V D S  L R B A  C I O @    P H D
50- B A @    P @ @ ~  @ A @ B  @ A @ G
60- @ A @ ~  ? @ @ ~  ? @ @ ~  ? @ @ ~
70- ~ M G M  L A N G  U A G E    N O T
80-   A V A  I L A B  L E R A  N G E
90- E R R O  R W R I  T E   P  R O T E
A0- C T E D  E N D    O F   D  A T A F
B0- I L E    N O T    F O U N  D V O L
C0- U M E    M I S M  A T C H  I / O
D0- E R R O  R D I S  K   F U  L L F I
E0- L E   L  O C K E  D S Y N  T A X
F0- E R R O  R N O    B U F F  E R S
```

This is a sector from a DOS 3.3 disk shown in the ASCII mode.

The brackets on the first line indicate the cursor position.

Control characters are shown in inverse video on the screen.

Data entry is still done in HEX.

```
                SECTOR EDITOR
-----------------------------------------
TRK=00            OPTIONS           SEC=00
-----------------------------------------

                DRIVE:1

                SLOT :6

            CHECKSUM ON/OFF

             FORMAT  13/16
```

This is an example of the screen display with the 'O' option.

The options are modified by pressing the key corresponding to the first letter of the option to change.

Appendix E contains lists the locations to change with the GLOBAL modifier to alter the address and data markers in the internal read/write routines.

CHAPTER 5

USING THE DISK DIAGNOSTICS

To use the disk diagnostics subsystem, select option 'D' from the main menu. A menu will be displayed with the following options:

```
        DISK DIAGNOSTICS

        S - SPEED TEST

        M - MEDIA VERIFY

        D - DEGAUSS DISK

    ENTER SELECTION ->
```

These are the options for the disk diagnostic systems options.

Selecting 'S' will enter the disk speed test. This will prompt the user to enter the number of the drive which is to be tested. A warning will then be displayed which asks the user to insert a BLANK diskette into the selected drive (Any data on the disk will be ERASED). Pressing any key will start the speed tester. If an error occurs while testing the diskette, a message will be displayed and any key may be pressed to return to the main menu. The speed test menu shows a pointer with the current disk speed in its center. This pointer moves from left to right and the arrow extending from the top of the pointer points to the current speed on the scale above. The units of this test are nibbles, and any value from -5 to +5 is normal. A small amount of jitter may be experienced, this is normal.

```
            DISK SPEED TEST
      (SLOW)                (FAST)
                  0
<---!----!----!----!----!----!----!--->
                  ^
                  !
              -------
              >-0002<
              -------

        PRESS <ESC> TO EXIT
```

This is an example of the screen display during a speed test.

This is marked in increments of 5.

The box contains the current speed offset from perfect.

To adjust the speed of your disk drive, the cover must be removed to access the adjustment. MAKE SURE THE POWER IS OFF! After removing the cover, locate the motor control board. This board is in the back of the drive, between the disk mechanism and the rear section of the baseplate. On the right hand side of this board, a small adjustable resistor will be seen. This is the speed adjustment. Making sure that nothing interferes with the open drive, and checking to see that all cables are securely in place, power on the Apple and boot NIBBLES AWAY][. Start the drive speed test and adjust the control on the drive so that the pointer spends most of its time between -5 and +5. POWER OFF THE APPLE! Then reassemble the disk drive and the process is complete.

WARNING: THIS PROCESS MAY VOID YOUR WARRANTY. If in doubt, or if you do not feel comfortable taking your computer apart, then consult your local Apple dealer.

Selecting 'D' from the diagnostics menu will select the DEGAUSS disk option. You will be prompted for the drive, starting and ending track numbers for the operation. A warning will then be displayed showing that any data on the disk will be ERASED. Pressing space will start the operation and the main menu will be displayed upon its termination.

Pressing 'M' from the diagnostics menu will invoke the MEDIA VERIFY system. You will be asked for the drive number to test, and then a warning similar to that described above will be displayed. Pressing space will start the process, and <ESC> may be used to stop the operation. A message will be displayed on completion of the test as to whether or not the disk has any bad sections. If the test reports an error, the disk should not be used for data storage.

Pressing 'Q' will return you to the main menu.

CHAPTER 6

USING THE FILER

To access the NIBBLES AWAY][Filer, select item 'F' from the main menu. This will result in a secondary menu containing the options in the filing system.

The Filer has two main purposes. The first is to allow the user to store parameters which are set up for backing up particular pieces of software. This is useful since the software may need to be backed up again at a later time, and the filer can reload the parameters which were previously used so that they do not have to be re-entered.

The second function of the Filer is the Auto-Load parameters. These are files contained on your NIBBLES AWAY][disk which are composed of all of the key sequences necessary to back-up certain software packages. For example, if a particular program requires that five parameters be changed, and has data on tracks 00-04 and 5.5-9.5, the Auto-Load file for that program would change those parameters and perform the backup on the required tracks. The way that the Filer accomplishes this is to automatically type in all of those keys which the user would normally have to enter. When an Auto-Load parameter is in operation, the characters being typed can be viewed on the screen as if the user were typing them directly (This is similar to the EXEC command in Apple DOS).

EXAMPLE OF THE FILER MENU

```
          FILER MENU

   L - LOAD PARAMETER FILE
   S - SAVE PARAMETER FILE
   D - DELETE PARAMETER FILE
   I - INITIALIZE DISKETTE
   X - EXECUTE EXEC FILE

 ENTER SELECTION ->
```

The letters on the left represent those keys which should be pressed for their respective functions listed on the right.

To load a parameter file, type 'L' at the Filer menu. The lower portion of the display will show up to 16 of those files on the disk in drive 1, with the file in the center of the screen in inverse. The inverse bar signifies the parameter which is selected when the <RETURN> key is pressed. Pressing the right and left arrow keys will scroll the names up and down so that the desired file name may be placed under the inverse bar. When the filename is in position, pressing the <RETURN> key will load that parameter file from the disk. The user may then proceed to NIBBLES AWAY][directly, or to the modifiers menu to view the current settings of the various parameters.

EXAMPLE OF PARAMETER LOAD SCREEN

```
          LOAD PARAMETER FILE
-----------------------------------------
 <--,--> = MOVE / <RET>=SELECT / Q=QUIT     These are the options.
-----------------------------------------


     SAMPLE PARAMETER FILE                  The file selected is
     PARAMETER FILE 1                       shown under an
     PARAMETER FILE 2                       inverse bar.
     PARAMETER FILE 3
```

NOTE: The parameters which are loaded and saved are BACKUP, CONTROL, FILTER, ERASE BUFFER and SYNC ADD. Any changes made through the GLOBAL modifier are not saved and must be re-entered if their use is needed at a later time.

In order to save any parameters, a data disk must first be formatted. This is done by pressing 'I' at the Filer menu. You will then be asked if you are sure if you wish to go on. Typing 'Y' here will result in a second warning, and an explanation that any data on the disk in the drive will be erased. (Make sure you have a blank diskette in the drive). NIBBLES AWAY][will then wait until a key is pressed, and then format the disk for parameter storage. At any time during this process, as in any other section of NIBBLES AWAY][, The <ESC> key may be pressed to exit to the master menu.

Once a data disk has been formatted, the command 'S' can be used to save the current parameters to the formatted disk. A data disk can hold 32 parameter files and a message will be displayed if that limit is exceeded. Pressing 'S' results in a prompt asking for a file name. This may be any name up to 28 characters in length (A bell will sound if you try to enter more than 28), and should provide some description of what parameters are set, perhaps the name of the program which they have been set up for. After pressing <RETURN>, the current parameters will be saved to disk and the name entered will be added to the list seen under the 'L' command.

The 'D' command has been provided so that unwanted paramet files may be removed from a data diskette. Selecting this opti will result in the same type of display as for loading parameter file, except that the file selected will be delet from the disk. TAKE GREAT CARE WHEN USING THIS FUNCTION as a files deleted CANNOT be restored.

The 'X' command starts the Auto-Load sequence. Aft selecting this option, a display similar to that seen with t 'L' and 'D' commands will be seen, except that the names sho will be different, since they come from a second directory on t NIBBLES AWAY][disk (Disk initialized with the 'I' command not have Auto-Load directories and will cause an error message be displayed if this option is selected with one). The moveme of the names is the same as for the previous options, and once filename is selected, you will be prompted to insert yo original and destination disks in their respective slots, a then to press any key. At this point the Auto-Load sequence wi begin and a backup will be made. During an Auto-Load t keyboard is locked out and only <ESC> has any effect (S below).When the Auto-Load sequence is finished, the main me will be displayed and you may proceed to the next desi function.

NOTE: The Auto-Load system uses the drives which have be selected under the 'N' option from the main menu. Th defaults to slot six, with drive one as the source and dri two as the destination. If you would like to change thes select 'N' from the main menu, enter 'Y' when asked if y would like to change the defaults, then enter the new valu for slot and drive. (You can press <ESC> to go back to t main menu without having to answer the rest of t questions).

The <ESC> key may be pressed at any time during an Auto-Lo sequence. This will halt the Auto-Load wherever it happens be, and return keyboard control to the user.

APPENDIX A

BEGINNERS GUIDE TO NIBBLES AWAY][

This section is designed for the beginning user who is trying to backup a piece of software, but is not having much luck with the default options.

The first thing to look for on a disk which refuses to backup is which tracks give errors. If a large number of errors are encountered across the disk, the AUTO HALF-TRACK option may help to find data that is on half-tracks. One thing to note about half tracks is that they can sometimes cause the AUTO HALF-TRACKS option to switch to half tracks one track late. The user may want to try to backup the previous half track to the first one found by the automatic system.

Synchronization is a protection method which is not detectable by looking at the disk data. If a disk, while booting, makes some violent head movements back and forth, this may indicate a synchronized protection system. Selecting SYNCHRONIZED COPY may allow a disk protected this way to work.

If these methods fail to produce results, the next step is to use the Track/Bit Editor. The main thing to look for are the address marks (See track dumps in chapter 3 and the Advanced users section). If these can be identified, they may be entered into the BACKUP modifier.

The following page contains a flow-chart for the procedure to backup disks which require more than the default options.

APPENDIX B

Advanced Users Guide

An explanation of how to translate the values shown in the memory dump into which parameters to change and what to change them to is the topic of the next few paragraphs. We will begin with some basic information on the way in which information is stored on a diskette.

Before every sector written on a given track on a diskette, a section of SYNC-BYTES are written. These are normally $FF's but other bytes can also be used. Next follows some type of address marker, which tells the computer which sector is about to pass under the head so that a particular sector can be located. After a few more SYNC-BYTES have been written, the actual data starts. This data is in an encrypted form, since the disk controller will not allow certain bytes to be written out properly. This means that only 4-6 bits out of a given byte from the disk contain actual data. After the data bytes, some closing bytes are usually written out, followed by the SYNC-BYTES which precede the next sector.

The sections of SYNC-BYTES are called GAPs, so the bytes in them are often refered to as GAPBYTEs. These GAPBYTEs can be picked out in a memory dump since they are usually in a large group (10-15 of them). NIBBLES AWAY][is initially set to recognize GAPBYTEs of $FE and $FF. If the diskette is formatted with some other GAPBYTE, then NIBBLES AWAY][must be made aware of this. The parameters GAPBYTE1 and GAPBYTE2 set the allowable range for GAPBYTEs. GAPBYTE1 should be set to the lowest value found in the GAP on a given diskette. GAPBYTE2 should be set to ONE MORE THAN the highest GAPBYTE found on that diskette. If the selected range of GAPBYTEs is too large, sections of data may appear to NIBBLES AWAY][to be GAPs. This would cause a loss of data. Therefore the selected upper and lower limits should give a range large enough to cover all the GAPBYTES which are used, but should not be any larger (In most cases, only one byte is used for all GAPs). If, for example, a diskette is found to use $AA's as GAPBYTEs, then GAPBYTE1 should be set to $AA and GAPBYTE2 should be set to $AB.

NIBBLES AWAY][can also be instructed to look for address markers directly. This is done by entering the specific address mark for a track into the BACKUP MODIFIER. The value entered will then be searched for instead of looking for any GAPs on a given track. This method tends to be more reliable, and is sometimes necessary if the GAPs are composed of many different bytes.

After the address marker, the second GAP (section of SYNC BYTES) is encountered, and then the data marker. When the second GAP is written out by a program there is usually a bit-shift error which causes the controller to become 'unlocked', much as a video tape recorder does over a section of bad tape. When NIBBLES AWAY][encounters a GAP, it looks for the end of the GAP for the address marker. Then a duplicate of that address marker must be located further along in the buffer to show that the data is valid. NIBBLES AWAY][must know the minimum number of bytes that may be in an address marker, to know how many bytes must match, since the unlocking of the controller at the start of the second gap will cause different data to be read each time. Normally there are at least $0C bytes in an address marker. If the amount is less, then FIND MAX must be adjusted to that value. Care should be taken not to adjust FIND MAX to a value less than $03 since any less number of bytes may not specify a unique combination of bytes.

The number of bytes which make up a GAP is normally at least $0F, but it can be much larger, as in the case of a DOS 3.2 diskette with many empty sectors, or it can be smaller, as on some protected disks. However, the number of GAPBYTEs must be larger than $04 due to the Apple][disk controller hardware. NIBBLES AWAY][has been set to look for at least $0C GAPBYTEs, but it may be necessary to alter this by reducing GAP SIZE if the GAPS are of a smaller size on the disk being backed-up.

On some diskettes which use non-standard GAPBYTEs, there may be a transition from one value GAPBYTE to another in the middle of a GAP. This can cause the controller to 'unlock', creating a glitch in the data. This can be seen using the TBE as several random bytes in the middle of a GAP. NIBBLES AWAY][has an internal routine which detects these glitches and skips over them. The two parameters controlling this routine are FALSE LO and FALSE HI. FALSE LO is how far beyond the apparent end of a GAP NIBBLES AWAY][should look for more GAPBYTEs. FALSE HI specifies up to what point GAPBYTEs must be found if a GAP does not really exist. The initial values work in almost all cases and rarely require adjustment of any kind.

The glitch detector may be turned off if its operation interferes with the backup of a diskette. This is done by answering 'N' to the OVERIDE GLITCH DETECT question in the BACKUP modifier.

If you are scanning over a diskette and the TBE reads in a track which is 'in between' two valid tracks, the data viewed may appear to be proper, except that there will probably be sections of 'glitches' in the GAPS, the address and data markers will change, and other slight variations will be seen because the disk drive head is reading a little bit from each of the two tracks to either side of it and mixing them together as it reads. This can be used to determine if a track is used or not, since two valid tracks CANNOT sit less than one full track apart on a diskette.

The values DATA MIN and DATA MAX specify the high order portion of the allowed length of a track. For example if DATA MIN is set to $13 and DATA MAX is set to $1D, then any track must have a length between $1300 and $1D00 bytes to be considered valid. These are the default values for these parameters, and should hold for most diskettes.

The size of the SYNC-BYTES is controlled by the parameter SYNC SIZ. If this value is set to 9, then 9 bit SYNC-BYTES will be written out in the GAPs and other selected locations. If this parameter is set to any other value, 10 bit SYNC will be used.

When NIBBLES AWAY][detects a GAP, it then finds the data following it. The GAPs are normally composed of SYNC-BYTEs so these must be reinserted. The parameter FIX AMNT controls the number of GAPBYTEs previous to the address mark which should be converted to SYNC. If the question 'OVERIDE SYNC CONVERT' is set to 'Y', then SYNC will not be added. The parameter FIX VALU controls what the GAPs are converted to when SYNC is added. If the question 'OVERIDE STANDARDIZER' is set to 'Y' then the values currently in the GAPs will be used as SYNC without changing them to anything else.

NIBBLES AWAY][uses the high bit of the data in the read/write buffer to signify whether or not it is to be written out as SYNC. If the high bit is set ('1'), then the byte will be written out normally. If the high bit is reset ('0'), then the byte will be written as SYNC, with its length controlled by the parameter SYNC SIZ. The 'H' option in the TBE can be used to toggle this bit to select any given byte as a SYNC-BYTE.

Some disk protection schemes use a technique known as bit-insert. This involves one SYNC-BYTE within a section of normal bytes. This cannot be detected by looking at the data in a track dump, due to the nature of the disk controller. The method used to reinsert this SYNC-BYTE is to find a set of bytes somewhere near the location of the SYNC-BYTE. This 'insert mark' is then entered into the BACKUP modifier. Normally the last byte of the insert mark is the SYNC-BYTE, however NIBBLES AWAY][provides a method to shift the point where the byte will be inserted backwards or forwards from the point where the insert mark is detected. The parameters controlling this are OFFSET + and OFFSET -. These define the positive and negative shift for the marker. The total shift is the sum of the two, so normally one parameter is zero and the other parameter specifies the entire shift in the desired direction (OFFSET + is positive while OFFSET- is negative). If both of these values were set to the same number, they would cancel each other out and the net result would be an offset of 0 (The default value).

The parameters PAGE LEN and LF VALUE control the printer output from the TBE. PAGE LEN is normally set to 66 lines (The standard paper size) but may be adjusted to any other desired value. (This value should not be set lower than $06). The LFVALUE parameter is the value that will be sent to the printer after every carriage return printed. If your printer has auto-linefeed, then this should be set to $00, since that is a null character and will cause no action on the printer.

The parameter PTR SLOT should be set to the slot number of your printer if it is other than the default value of $01.

NIBBLES AWAY][may be used with most parallel and serial cards which are compatible with Apple Pascal. Those which have hardware on the cards to perform their functions will operate. If the card is a 'firmware' type card which requires that the driving program call routines upon the card are not compatible. The easiest way to see if a given printer is compatible is to try it! NIBBLES AWAY][will tell you if the card in the assigned slot is not one of the valid types.

APPENDIX C

NOTES ON NIBBLE COUNTING

Nibble counting is a protection technique used by some manufacturers. It involves counting the number of nibbles present on a particular track when the disk is created. Since all disk drives spin at a slightly different speed, this number will vary from disk to disk. The nibble count is recorded at another point in the program, so that it can be verified when the program runs. The number of nibbles around a track will be constant, no matter what drive it is read on (As long as the drive's speed is within reason). In order to duplicate this, NIBBLES AWAY][has a nibble count feature included. It's use and abuse is described below.

To use the nibbles count option in NIBBLES AWAY][, a 'Y' must be supplied in response to the 'USE NIBBLE COUNTING' question in the BACKUP modifier. In order for the nibble counter to function correctly, an address mark should also be specified. Then the standard procedure should be used to backup the desired tracks, after making the CONTROL parameter changes noted below.

There are two types of tracks which can require nibble counting, those which have a standard amount of information, and those which contain only a few bytes of information with the rest of the disk taken up by SYNC-BYTEs. The parameters SHIFT N+ and SHIFT N- control which type of track is being backed up. These parameters are set up for the first type of track mentioned. If the second type of track is being backed up, then the parameters should be changed to SHIFT N+ --> $08 and SHIFT N- --> $00 (This is the reverse of their current settings). For this second type of track, the parameter FIND MAX should also be set to $03, since there usually are not enough stable bytes for the default value to work.

While nibble counting is running, four values are displayed on the screen. The first is preceeded by a '1=' and indicates the number of nibbles on the source track. After the '2=' is the current length of the destination track. This will vary as the process progresses, getting closer and closer to the original tracks length. The value after the 'P=' indicates an internal pointer to the write buffer. This pointer's value will change during the backup, but if its value exceeds $8000 a WRITE ERROR will occur. This indicates that the drive speed was not within the range needed to backup that track. The disk speed test system can be used to adjust the speed of the drive to a HIGHER value. The backup can then be repeated and if the speed has been increased sufficiently, all will go succesfully.

The number after the 'D=' indicates the difference betwe the two track lengths. The parameter TOLERANC may be set to t allowable difference between the two track (normally 0). T value of TOLERANC should not be set higher than $07. If t difference value shows as a number less than 0 (e.g. $FFFC) means that the second track is shorter than the first, a NIBBLES AWAY][will correct in the other direction. When difference in the allowable range is detected, it must repeated at least MATCH NM times, so this parameter ma adjusted to assure that the nibble count is valid. The initi value of $03 is sufficient in most cases.

Since nibble counting is probably the most difficu operation for NIBBLES AWAY][, it is also the one most prone errors due to parameters not being set exactly right. If th value of 'P=' is decreasing, and it is the only value changin then one or more parameters are not set properly. Readjustin the parameters and repeating the back-up should correct th problem.

NOTE: SYNC SIZ should always be set to $09 when performing nibble count. If any other value is used, unstable nibbl counts on the destination disk may occur. A value of $0 will usually allow those tracks where the 'P=' value get very close to $8000 and then fails via a WRITE ERROR t appear to backup properly. If this value is used, a large value of MATCH NM (about $0A) should be used to assure proper nibble count.

DECIMAL-HEX-ASCII CONVERSION CHART

DEC	HEX	ASCII	DEC	HEX	ASCII	DEC	HEX	ASC
000	$00	ctrl-@	042	$2A	*	084	$54	
001	$01	ctrl-A	043	$2B	+	085	$55	
002	$02	ctrl-B	044	$2C	,	086	$56	
003	$03	ctrl-C	045	$2D	-	087	$57	
004	$04	ctrl-D	046	$2E	.	088	$58	
005	$05	ctrl-E	047	$2F	/	089	$59	
006	$06	ctrl-F	048	$30	0	090	$5A	
007	$07	ctrl-G	049	$31	1	091	$5B	
008	$08	ctrl-H	050	$32	2	092	$5C	
009	$09	ctrl-I	051	$33	3	093	$5D	
010	$0A	ctrl-J	052	$34	4	094	$5E	
011	$0B	ctrl-K	053	$35	5	095	$5F	
012	$0C	ctrl-L	054	$36	6	096	$60	
013	$0D	ctrl-M	055	$37	7	097	$61	
014	$0E	ctrl-N	056	$38	8	098	$62	
015	$0F	ctrl-O	057	$39	9	099	$63	
016	$10	ctrl-P	058	$3A	:	100	$64	
017	$11	ctrl-Q	059	$3B	;	101	$65	
018	$12	ctrl-R	060	$3C	<	102	$66	
019	$13	ctrl-S	061	$3D	=	103	$67	
020	$14	ctrl-T	062	$3E	>	104	$68	
021	$15	ctrl-U	063	$3F	?	105	$69	
022	$16	ctrl-V	064	$40	@	106	$6A	
023	$17	ctrl-W	065	$41	A	107	$6B	
024	$18	ctrl-X	066	$42	B	108	$6C	
025	$19	ctrl-Y	067	$43	C	109	$6D	
026	$1A	ctrl-Z	068	$44	D	110	$6E	
027	$1B	ctrl-[	069	$45	E	111	$6F	
028	$1C	ctrl-\	070	$46	F	112	$70	
029	$1D	ctrl-]	071	$47	G	113	$71	
030	$1E	ctrl-	072	$48	H	114	$72	
031	$1F	ctrl-_	073	$49	I	115	$73	
032	$20	SPACE	074	$4A	J	116	$74	
033	$21	!	075	$4B	K	117	$75	
034	$22	"	076	$4C	L	118	$76	
035	$23	#	077	$4D	M	119	$77	
036	$24	$	078	$4E	N	120	$78	
037	$25	%	079	$4F	O	121	$79	
038	$26	&	080	$50	P	122	$7A	
039	$27	'	081	$51	Q	123	$7B	
040	$28	(	082	$52	R	124	$7C	
041	$29	)	083	$53	S	125	$7D	

DECIMAL-HEX-ASCII CONVERSION CHART

DEC	HEX	ASCII	DEC	HEX	ASCII	DEC	HEX	ASC
126	$7E	~	169	$A9	)	212	$D4	
127	$7F	DEL	170	$AA	*	213	$D5	
128	$80	ctrl-@	171	$AB	+	214	$D6	
129	$81	ctrl-A	172	$AC	,	215	$D7	
130	$82	ctrl-B	173	$AD	-	216	$D8	
131	$83	ctrl-C	174	$AE	.	217	$D9	
132	$84	ctrl-D	175	$AF	/	218	$DA	
133	$85	ctrl-E	176	$B0	0	219	$DB	
134	$86	ctrl-F	177	$B1	1	220	$DC	
135	$87	ctrl-G	178	$B2	2	221	$DD	
136	$88	ctrl-H	179	$B3	3	222	$DE	
137	$89	ctrl-I	180	$B4	4	223	$DF	
138	$8A	ctrl-J	181	$B5	5	224	$E0	
139	$8B	ctrl-K	182	$B6	6	225	$E1	a
140	$8C	ctrl-L	183	$B7	7	226	$E2	b
141	$8D	ctrl-M	184	$B8	8	227	$E3	c
142	$8E	ctrl-N	185	$B9	9	228	$E4	d
143	$8F	ctrl-O	186	$BA	:	229	$E5	e
144	$90	ctrl-P	187	$BB	;	230	$E6	f
145	$91	ctrl-Q	188	$BC	<	231	$E7	g
146	$92	ctrl-R	189	$BD	=	232	$E8	h
147	$93	ctrl-S	190	$BE	>	233	$E9	i
148	$94	ctrl-T	191	$BF	?	234	$EA	j
149	$95	ctrl-U	192	$C0	@	235	$EB	k
150	$96	ctrl-V	193	$C1	A	236	$EC	l
151	$97	ctrl-W	194	$C2	B	237	$ED	m
152	$98	ctrl-X	195	$C3	C	238	$EE	n
153	$99	ctrl-Y	196	$C4	D	239	$EF	o
154	$9A	ctrl-Z	197	$C5	E	240	$F0	p
155	$9B	ctrl-[	198	$C6	F	241	$F1	q
156	$9C	ctrl-\	199	$C7	G	242	$F2	r
157	$9D	ctrl-]	200	$C8	H	243	$F3	s
158	$9E	ctrl-^	201	$C9	I	244	$F4	t
159	$9F	ctrl-_	202	$CA	J	245	$F5	u
160	$A0	SPACE	203	$CB	K	246	$F6	v
161	$A1	!	204	$CC	L	247	$F7	w
162	$A2	"	205	$CD	M	248	$F8	x
163	$A3	#	206	$CE	N	249	$F9	y
164	$A4	$	207	$CF	O	250	$FA	z
165	$A5	%	208	$D0	P	251	$FB	{
166	$A6	&	209	$D1	Q	252	$FC	|
167	$A7	'	210	$D2	R	253	$FD	}
168	$A8	(	211	$D3	S	254	$FE	~
						255	$FF	DEL

APPENDIX E

MISCELLANEOUS NOTES

1. To print out a given buffer from the TSE, the print opti in the TBE may be used. The starting and ending address for each buffer are given below:

Buffer	Start	End
0	$2000	$2100
1	$2100	$2200
2	$2200	$2300
3	$2300	$2400
4	$2400	$2500
5	$2500	$2600
6	$2600	$2700
7	$2700	$2800

NOTE: The listing of address and data mark locations is on t insert sheet found at the front of this manual.

NOTES